REMARKS

In the last Office Action, claims 1, 2 and 4 were rejected under 35 U.S.C. §103(a) as being unpatentable over US 6,552,456 to Goto et al. ("Goto") in view of US 6,674,200 to Tokunaga. Claim 3 was rejected under 35 U.S.C. 103(a) as being unpatentable over Goto in view of Tokunaga and further in view of US 5,289,064 to Sakamoto. The Examiner indicated acceptance of the drawings and consideration of the information disclosure statement previously submitted by applicants.

In accordance with this response, independent claim 1 has been amended to incorporate the subject matter of dependent claim 2, which has been canceled. Claim 1 has otherwise been amended in minor formal respects. Original claims 3-4 remain as originally presented. New claims 5-10 have been added to provide a fuller scope of coverage. The specification has been amended to correct informalities and provide a direct antecedent basis for the claim language.

Applicants respectfully request reconsideration of their application in light of the foregoing amendments and the following discussion.

The present invention relates to a motor for use, for example, in a hard disc drive for rotating a recording medium. Such motors are provided with fluid dynamic bearings to enable the recording medium to rotate freely at high

rotational speeds. The present invention has been devised to develop a motor that prevents the rotor from vibrating in the axial direction while rotating at high speeds and which also reduces current consumption while operating the motor.

One example of a motor constructed according to the present invention, and embodied in the claims, is shown in Figs. 1-3. The motor comprises a stator 2 having cores 33 and coils 35, and a rotor 3 having a permanent magnet 45 arranged in a ring shape on the radial inner side of the stator 2, facing the cores and coils. A fluid dynamic bearing 4 rotatably supports the rotor 3 with respect to the stator 2.

The fluid dynamic bearing 4 comprises a shaft body 5 fixed to the rotor 3, and a shaft body support part 7 which, as shown, has a closed end and is fixed to the stator 2 and in which a shaft body insertion hole 7a is formed for rotatably accommodating the shaft body 5. A fluid 9 is filled in a clearance formed between the shaft body and the shaft body insertion hole. The shaft body 5 has a thrust shaft part 11 in the form of a flange, and a radial shaft part 15 and a support part 13 provided on opposite axial sides of the thrust shaft part 11.

The shaft body support part 7 has a small diameter cylinder part 25 which forms a closed end side of the shaft body insertion hole 7a, a large diameter cylinder part 27 which forms an open side of the shaft body insertion hole 7a,

and a counter plate 23 that covers the open end of the shaft body insertion hole 7a and forms a capillary seal with the support part 13.

In accordance with the invention, the ratio of the outer diameter of the thrust shaft part or flange 11 to the outer diameter of the permanent magnet 45 is approximately 1 to 2. As described in detail in the specification on pages 15-18, applicants have discovered that this 1 to 2 ratio effectively prevents undue vibration of the rotor 3 in the axial direction while also reducing the current consumption required to rotate the rotor 3. As described in the specification, rotor vibration and current consumption are dependent on various factors including the diameter and volume of the permanent magnet 45, the point of action of the torque, the deviation in the perpendicularity of the rotor 3 to the shaft body 5, the variation of the thrust dynamic pressure and the resistance to rotation of the rotor 3. By constructing the motor such that the outer diameter of the permanent magnet 45 is approximately twice that of the thrust shaft part 11, it is possible to prevent the rotor from vibrating in the axial direction, and also possible to reduce the current consumption required to rotate the rotor.

No similar motor is disclosed or suggested by the prior art.

Goto discloses two different motors in Figs. 4 and 5, which the Examiner has apparently considered as one embodiment but, in fact, are two different embodiments. The motor shown in Fig. 4 comprises a stator having cores and coils, a rotor having a permanent magnet 38 arranged in a ring shape, and a fluid dynamic bearing which rotatably supports the rotor with respect to the stator. The fluid dynamic bearing has a shaft body 31 fixed to the rotor, the shaft body being provided with a thrust shaft part 33 formed in a flange shape, and a radial shaft part 32.

In rejecting claim 2, the subject matter of which has been added to claim 1, the Examiner states that Goto discloses a motor in which a ratio of the outer diameter of the thrust shaft part 33 to the outer diameter of the permanent magnet 38 is approximately 1 to 2. This is not correct. Annexed hereto is marked-up copy of Fig. 4 of Goto on which the outer diameter of the thrust shaft part 33 is denoted D1 and the outer diameter of the permanent magnet 38 is denoted D2. As can be seen, the ratio D1 to D2 is approximately 1 to 3 -- which is <u>not</u> approximately 1 to 2.

Tokunaga has been relied upon for its teaching of a motor having a ring-shaped permanent magnet 12 arranged on the radial inner side of a stator 14, and it is clear that Tokunaga likewise does not disclose the claimed ratio of approximately 1 to 2. Similarly, Sakamoto does not disclose this ratio.

Therefore, even if the references were modified and combined in the manner done in the statement of rejection, the modified Goto motor would not resemble that recited in amended claim 1. One of ordinary skill in the art, with the references before him, would not have been led by any teaching in the references to re-configure the parts of the Goto motor to replicate the motor recited in claim 1.

Claim 3, which depends on claim 1, includes the limitation that the permanent magnet is only fixed on an axial direction surface of the rotor, and that an inner peripheral surface of the permanent magnet located on an opposite side to an outer peripheral surface facing the cores and coils is open. As to this limitation, the Examiner has relied upon Sakamoto. However, as is clear from Figs. 1A and 1B of the reference, Sakamoto does not disclose a construction in which the inner peripheral surface of the permanent magnet 1 <u>that is located on an opposite side to an outer peripheral surface facing the cores and coils</u> is open. In Sakamoto, the outer peripheral surface of the permanent magnet 1 does not face the

cores and coils, but rather the inner peripheral surface of the permanent magnet faces the cores and coils. Thus the limitation of claim 3 is not taught by Sakamoto.

Unlike the invention, in Sakamoto, it is not possible to create redundant or open space on the inner peripheral surface side of the permanent magnet. Consequently, in the Sakamoto motor, it is not possible to extend the thickness of the cylindrical wall part of the shaft body support part in a radial outward direction to reduce the redundant space. Consequently, with the Sakamoto motor construction, it is not possible to achieve an improvement in the strength of the shaft body support part without increasing the diameter of the motor.

Therefore, it is clear that Sakamoto does not teach a motor wherein an inner peripheral surface of the permanent magnet, which is located on an opposite side to an outer peripheral surface facing the cores and the coils, is open. Moreover, it is clear that Sakamoto does not teach a relation between the structure of the motor and the reduction in size of the motor. Thus the combined teachings of Goto, Tokunaga and Sakamoto do not render obvious the subject matter of claim 3.

Newly added independent claim 5 is directed to a motor and includes the limitations of a rotor having a ring-shaped permanent magnet disposed radially inwardly of the ring of cores forming the stator such that the radial outer side of the permanent magnet is spaced from and faces the magnetic pole pieces of the stator, and a ratio of the outer diameter of the flange of the shaft body of the fluid dynamic bearing to the outer diameter of the permanent magnet is approximately 1 to 2. As noted above, Goto does not disclose these limitations, nor would it have been obvious to one skilled in the art to have modified the Goto motor in view of Takunaga and Sakamoto to replicate the motor of claim 5.

Dependent claim 8 and 9 include the structure of the stator base portion which has a hole in which is fitted a bottom portion of the shaft body support such that the radial inner side of the permanent magnet is spaced from and faces the outer surface of the stator base portion in the region of the hole (claim 8) and that the space between the facing permanent magnet and the stator base portion is open and free of any structure (claim 9). It is not seen where these limitations are found in Goto as modified by Takunaga and Sakamoto.

In light of the foregoing, the application is now believed to condition for allowance. Accordingly, favorable reconsideration and passage of the application to issue are respectfully requested.

Respectfully submitted,

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